AMENDMENTS TO THE CLAIMS

Pursuant to 37 C.F.R. § 1.121 the following listing of claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS

1. (Currently amended) A BDPD-based (Base-band Digital Pre-Distortion) method for improving efficiency of an RF power amplifier, comprising:

(1) Determining structural parameters of a neural network as required and establishing the neural network, inputting modeling data and initial values of network parameters required for establishing a neural network model of the RF power amplifier;

(2) Propagating forward with the input data and network parameters, calculating the difference between an output value of the neural network and an expected output value, then propagating backward along the neural network with said difference to correct the network parameters;

(3) Determining whether said difference meets a specified criterion; if so, outputting the neural network model of the RF power amplifier and going to step (4), otherwise inputting the corrected network parameters to the neural network and going to step (2);

(4) Solving a pre-distortion algorithm of the RF power amplifier with said neural network model;

(5) Carrying out pre-distortion processing for input signal of the RF power amplifier with said pre-distortion algorithm and then feeding them to the RF power amplifier;

wherein said modeling data comprises: output signal Y(KT), input signal, and delay items of input signal of the power amplifier.

2.(Currently amended) A BDPD-based method for improving efficiency of RF power amplifier according to claim 1, wherein

said structural parameters comprise: a number n of delay items of input signal, a

number r of neural elements on each layer of the neural network, a number m of layers of the neural network;

~~said modeling data comprises: output signal Y(KT), input signal, and delay items of input signal of the power amplifier;~~

said network parameters comprise: weight Wijk and bias bij;

said output signal Y(KT) of the RF power amplifier is the expected output value corresponding to the input signal.

3.(Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein said input signal and said delay items of the input signal are base-band digital signal amplitude X(KT) of the power amplifier and delay items thereof X[(K-1)T] ... X[(K-n+1)T], respectively.

4.(Previously presented) A BDPD-based method for improving efficiency of RF power amplifier according to claim 3, wherein the number n of delay items of input signal is: $1 < n < 10$, the number r of neural elements on each layer of the neural network is: $1 < r < 10$, the number m of layers of the neural network is: $1 < m < 10$.

5.(Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein said input signal and said delay items of input signal are base-band digital signal amplitude X(KT) of the power amplifier and delay items thereof X[(K-1)T], X[(K-2)T], ..., X[(K-n+1)T] as well as phase Φin(KT) of the base-band digital signal and delay items thereof Φin[(K-1)T], Φin[(K-2)T], ..., Φin[(K-n+1)T]; the number of delay items of the input signal comprises the number n1 of delay items of base-band digital signal amplitude and the number n2 of delay items of base-band digital signal phase.

6. (Previously presented) A BDPD-based method for improving efficiency of RF power

amplifier according to claim 5, wherein the number n1 of delay items of the base-band digital signal amplitude is: $1 < n1 < 5$, the number n2 of the delay items of base-band digital signal phase is: $1 < n2 < 10$, the number r of neural elements on each layer of the neural network is: $1 < r < 10$, the number m of layers of the neural network is: $1 < m < 10$.

7. (Previously presented) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein said step (2) further comprises:

(71) Calculating corresponding intermediate variables Vij of the neural network with network parameters Wijk of each layer of the neural network;

(72) Activating a function to calculate an output value Yij of each neural element in the corresponding neural network through the intermediate variables Vij and the neural elements;

(73) Magnifying the output value of the neural elements on a last layer of the neural network for m times to obtain an output value Ym(KT) of the neural network, herein the value of M being higher than the saturation level of the RF power amplifier;

(74) Calculating the difference between Ym(KT) and actual output Y(KT) of the RF power amplifier;

(75) Magnifying the difference e(kT) between Ym(KT) and Y(KT) for -m times and calculating Ω(Vij) with output value Vij of the neural elements on the last layer of the network, herein,$\Omega(v)=d\Psi(v)/dv$;

(76) Multiplying Me(kT) with Ω(Vij) to obtain δij;

(77) Propagating δij backward along the network channel, in which propagating forward is carried out, with current values of network parameters and obtaining the intermediate variables ui1, ui2, ..., uir;

(78) Calculating intermediate variables δi1, δi2, ..., δir with ui1, ui2, ..., uir and current network parameters;

Herein, δi1, δi2, ..., δir are obtained through multiplying Ω(Vi1), Ω(Vi2), ..., Ω(Vir) with ui1, ui2, … uir respectively, said Ω(Vi1), Ω(Vi2), ... Ω(Vir) are calculated out with intermediate variable vi1, vi2, ..., vir;

(79) Updating current network parameters with δi1, δi2, ..., δir, and calculating c with the following equation: $c=[\Sigma(\delta i1^2+\delta i2^2+...+\delta ir^2)+\delta ij\ ^2]^{1/2}$;

Wherein when updating the current network parameters, the updated network parameters Wijk and bij are calculated out as follows:

Wijk= value of network parameter before update - η×δij × output value of corresponding neural elements, herein η is the searching step length;

bij = value of network parameter before update - η×δij.

8. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 7, wherein said step (3) comprises: determining whether c meets the criterion; if so, outputting the neural network model of the RF power amplifier, otherwise inputting the corrected network parameters Wijk and bij to the neural network and going to step (71).

9. (Original) A BDPD-based method for improving efficiency of RF power amplifier according to claim 7, wherein said K = 2 × mean gain kb of RF power amplifier.

10. (Previously presented) A BDPD-based method for improving efficiency of RF power amplifier according to claim 2, wherein a bandwidth of said input signal is wider than that of actual input signal of RF power amplifier.

11. (New) A BDPD-based (Base-band Digital Pre-Distortion) method for improving efficiency of RF power amplifier, comprising:

(1) Determining structural parameters of a neural network as required and establishing

the neural network, inputting modeling data and initial values of network parameters required for establishing a neural network model of the RF power amplifier;

(2) Propagating forward with the input data and network parameters, calculating the difference between output value of the neural network and an expected output value, then propagating backward along the neural network with said difference to correct the network parameters;

(3) Determining whether said difference meets a specified criterion; if so, outputting the neural network model of the RF power amplifier and going to step (4), otherwise inputting the corrected network parameters to the neural network and going to step (2);

(4) Solving the pre-distortion algorithm of the RF power amplifier with said neural network model;

(5) Carrying out pre-distortion processing for input signal of the RF power amplifier with said pre-distortion algorithm and then feeding them to the RF power amplifier;

wherein-said structural parameters comprise: a number n of delay items of input signal, a number r of neural elements on each layer of the neural network, a number m of layers of the neural network; said modeling data comprises: output signal Y(KT), input signal, and delay items of input signal of the power amplifier; said network parameters comprise: weight Wijk and bias bij; said output signal Y(KT) of the RF power amplifier is the expected output value corresponding to the input signal.

12. (New) A BDPD-based method for improving efficiency of RF power amplifier according to claim 11, wherein said input signal and said delay items of the input signal are base-band digital signal amplitude X(KT) of the power amplifier and delay items thereof X[(K-1)T] ... X[(K-n+1)T], respectively.

13. (New) A BDPD-based method for improving efficiency of RF power amplifier according to claim 12, wherein the number n of delay items of input signal is: $1 < n < 10$, the

number r of neural elements on each layer of the neural network is: $1 < r < 10$, the number m of layers of the neural network is: $1 < m < 10$.

14. (New) A BDPD-based method for improving efficiency of RF power amplifier according to claim 11, wherein said input signal and said delay items of input signal are base-band digital signal amplitude X(KT) of the power amplifier and delay items thereof X[(K-1)T], X[(K-2)T], ..., X[(K-n+1)T] as well as phase Φin(KT) of the base-band digital signal and delay items thereof Φin[(K-1)T], Φin[(K-2)T], ..., Φin[(K-n+1)T]; the number of delay items of the input signal comprises the number n1 of delay items of base-band digital signal amplitude and the number n2 of delay items of base-band digital signal phase.

15. (New) A BDPD-based method for improving efficiency of RF power amplifier according to claim 14, wherein the number n1 of delay items of base-band digital signal amplitude is: $1 < n1 < 5$, the number n2 of delay items of base-band digital signal phase is: $1 < n2 < 10$, the number r of neural elements on each layer of the neural network is: $1 < r < 10$, the number m of layers of the neural network is: $1 < m < 10$.

16. (New) A BDPD-based method for improving efficiency of RF power amplifier according to claim 11, wherein said step (2) comprises:

(71) Calculating the corresponding intermediate variables Vij of the neural network with network parameters Wijk of each layer of the neural network;

(72) Activating the function to calculate the output value Yij of each neural element in the corresponding neural network through the intermediate variables Vij and the neural elements;

(73) Magnifying the output value of the neural elements on the last layer of the neural network for m times to obtain the output value Ym(KT) of the neural network, herein the

value of M being higher than the saturation level of the power amplifier;

(74) Calculating the difference between Ym(KT) and actual output Y(KT) of the power amplifier;

(75) Magnifying the difference e(kT) between Ym(KT) and Y(KT) for -m times and calculating Ω(Vij) with output value Vij of the neural elements on the last layer of the network, herein,$\Omega(v)=d\Psi(v)/dv$;

(76) Multiplying Me(kT) with Ω(Vij) to obtain δij;

(77) Propagating δij backward along the network channel, in which propagating forward is carried out, with current values of network parameters and obtaining the intermediate variables ui1, ui2, ..., uir;

(78) Calculating intermediate variables δi1, δi2, ..., δir with ui1, ui2, ..., uir and current network parameters;

Herein, δi1, δi2, ..., δir are obtained through multiplying Ω(Vi1), Ω(Vi2), ..., Ω(Vir) with ui1, ui2, ... uir respectively, said Ω(Vi1), Ω(Vi2), ... Ω(Vir) are calculated out with intermediate variable vi1, vi2, ..., vir;

(79) Updating current network parameters with δi1, δi2, ..., δir, and calculating c with the following equation: $c=[\sum(\delta i12 < \delta i22 < ...+\delta ir2)+\delta ij\ 2]1/2$;

Wherein when updating the current network parameters, the updated network parameters Wijk and bij are calculated out as follows:

Wijk= value of network parameter before update - $\eta\times\delta ij\times$ output value of corresponding neural elements, herein η is the searching step length;

bij = value of network parameter before update - $\eta\times\delta ij$.

17. (New) A BDPD-based method for improving efficiency of RF power amplifier according to claim 16, wherein said step (3) comprises: determining whether c meets the criterion; if so, outputting the neural network model of the RF power amplifier, otherwise inputting the corrected network parameters Wijk and bij to the neural network and going to

step (71).

18. (New) A BDPD-based method for improving efficiency of RF power amplifier according to claim 16, wherein said $K = 2 \times$ mean gain kb of RF power amplifier.

19. (New) A BDPD-based method for improving efficiency of RF power amplifier according to claim 11, wherein the bandwidth of said input signal is wider than that of actual input signal of RF power amplifier.